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(54) A composition for application to a soil or plant locus.

(57) A composition for agricultural application which contains a major amount of water and a minor amount of an alkaline earth metal alginate gel uniformly dispersed through the water. The composition may include an active ingredient such as a herbicide, pesticide, fungicide, fertiliser or the like. The composition may also contain a suitable wetting agent to assist in spreading it on a surface to which it is applied.

EP 0 274 851 A1

A COMPOSITION FOR APPLICATION TO A SOIL OR PLANT LOCUS

BACKGROUND OF THE INVENTION

This invention relates to an additive for agricultural chemical compositions.

Agricultural chemicals such as herbicides, fertilisers, insecticides, fungicides and the like are applied in a variety of formulations and compositions. The compositions may take the form of dusting powders or granules, dispersible powders or granules, aqueous dispersions or emulsions and sprays and aerosol formulations. The active ingredients for such formulations are dispersed in a variety of mediums or carriers depending on the nature of the formulation.

Alginate gels are derived from seaweed and are used in various food products in a highly purified form, i.e. less than 0,1 percent by weight of + 10 micron insolubles. Alginate gels have not, to the best of the Applicant's knowledge, been used in any agricultural applications.

SUMMARY OF THE INVENTION

According to the present invention, there is provided a composition for application to a soil or plant locus including a gel which comprises a major amount of water and minor amount of an alginate gel matrix uniformly dispersed through the water. The composition thus includes, as an essential component an alginate gel. Water forms the continuous phase and the alginate gel matrix the dispersed phase.

According to another aspect of the invention, there is provided a method of treating a soil or plant locus including the step of applying to that locus a composition described above.

DETAILED DESCRIPTION OF THE INVENTION

It has been found that the composition adheres well to surfaces such as soil, and leaves and other foliage of plants. These adherent or sticking properties of the composition allow it to be used in a number of applications. For example, the composition contains a considerable amount of water and that water is retained on the surface to which the composition has been applied for a long period. This property may be used for fighting fires or preventing the spread of fires in forests and other agricultural areas. Active ingredients such as herbicides, fertilisers, insecticides, fungicides, and the like may be included in the composition. These active ingredients will be retained on the surface to which the composition has been applied.

The composition has particular application for sprays. The alginate gel of the composition is thixotropic which means that although it is thick and viscous, it will spray easily either from the ground or from the air at high concentrations. Due to the polymer structure of gel, spray particles of a uniform size are produced and drift is substantially reduced. The composition may be used for spraying herbicides, pesticides, fertilisers and foliar compositions.

The water will generally be present in the gel in an amount of at least 90 percent by weight, and the alginate gel matrix will generally be present in an amount of up to 5 percent by weight of the gel.

The alignate gel matrix is preferably an alkaline earth metal alginate gel matrix. The preferred alkaline earth metals are calcium, magnesium and mixtures thereof. The gel may be formed by bringing together a solution of a soluble alginate, for example, sodium alginate, and a dispersion of a finely divided, poorly soluble alkaline earth metal salt. It is important that in producing the gel there is a slow reaction of the alkaline earth metal salt with the soluble alginate for otherwise an insoluble fibrous alginate may well form. The amount of alkaline earth metal salt will generally be about 30 to 65 percent by weight of the soluble alginate. The preferred metal salt is dibasic calcium phosphate which will produce a calcium alginate gel.

The gel may also be produced by bringing together a soluble alginate such as sodium alginate, and a pre-swelled bentonite. Bentonite is a montmorillonite which swells when wetted with water. The weight ratio of the soluble alginate to bentonite is preferably in the range 1:1 to 1:10.

The soluble alginate may be produced by boiling seaweed in an alkaline salt solution, such as a sodium carbonate solution, milling the thus treated seaweed, and then removing, e.g. by filtration, large, e.g. + 150 micron, insolubles.

After bringing together the pre-swelled bentonite and soluble alginate, the combination will be left for a

time to allow the alkaline earth metal ions of the bentonite to react with the soluble alginate and form an alkaline earth metal alginate gel. The gel may then be treated, e.g. by filtration, to remove + 70 micron insolubles. The resulting product is a coloured alginate gel containing at least 0,05 percent, generally at least 0.5 percent by weight of - 70 micron insolubles. Such a gel, while suitable for agricultural applications, is totally unsuitable for food applications.

In this manner a calcium, magnesium or mixed calcium/magnesium alginate gel may be produced. This is the preferred method because bentonite is a good and economic slow release source of alkaline earth metal ions. Further the gel is a more stable gel than that produced using an alkaline earth metal salt.

The composition of the invention may also contain a wetting agent. The wetting agent assists in improving the spreadability of the composition on the surface to which it is applied. The preferred wetting agent is an anionic surface surfactant. Non-ionic surfactants may also be used. Examples of suitable non-ionic surfactants are linear primary alcohol ethoxylates, polyoxythylene dodecyl phenol, polyoxyalkylene nonyl phenol, polyoxyethylene octyl phenol, ethoxylated castor oil, polyoxyethylated sorbitol, polyoxyethylene stearate, sorbitan monolaurate, sorbitan monostearate and sorbitan monoolcate. Examples of anionic surfactants are alkylaryl sulfonates, lauryl polyoxyethylene salts, dioctyl sodium sulfosuccinate, salts of lignosulfonic acids, salts of sulfate ester of nonylphenoxypoly (ethylenoxy) ethanol, polyoxyethylene nonylphenol phosphate esters, tall oil and salts of alkyl sulfates.

The composition of the invention may also include an active ingredient such as a herbicide, pesticide, fertiliser, fungicide or the like. The amount of active ingredient present will vary according to the nature of the active ingredient and the application to which the composition is to be put. Examples of active ingredients are mancozeb, paraquat, fenthion, malathion, and the like.

The composition of the invention will typically be applied to a soil or plant locus by spraying. To this end, the composition will generally be diluted with water to the desired concentration. The dilution will vary according to the application.

In one particular form of the invention, the composition includes a thripsicide such as a salt of an antimony carboxylic acid having an alpha monohydroxy group or nicotine sulphate. The preferred thripsicide is tartar emetic which has the chemical name potassium antimony tartrate. The composition is applied to citrus fruit where thrips, also known as Scirtothrips Aurantii Sauri, causes considerable damage to citrus fruit by eating the tissue around the calyx when the fruit is still young and small. This damage then heals as a scar which stretches as the fruit grows and causes unsightly discolouration to the skin around the calyx. In many cases these fruits are unsaleable. The composition containing the thripsicide is applied to the citrus trees. The alginate gel provides a non-phytotoxic protective coating for the thripsicide active ingredient which nevertheless allows the thripsicide to function effectively.

Typical uses and compositions of the invention are set out in Table 1.

TABLE 1

Use	Composition		Dilution In Use (Amount of Composition Added to 100ℓ Water)	Active Ingredient
	Alginate Gel (% by weight)	Wetting Agent (% by weight)		
Thripsicide	100	0	250 to 1000ml	Tartar emetic 400g plus sugar 400g
Red Spider Remedy	40 to 75	0.5 to 1	1 to 5ℓ	Organo-phosphate (optional)
Soil Penetration Inhibitor	30 to 60	1 to 30	50 to 250ml	Atrazine
Forest Fire Fighting	50 to 90	2 to 10	100 to 1000ml	None
Wetter/ Sticker Adjuvant for Sprays	30 to 60	10 to 30	50 to 250	Trace Elements Fungicide, Pesticide or Herbicide

COMMENTS

1. The sugar which is added to the thripsicide is present as a bait.

2. For the red spider remedy, the composition when diluted is applied to an infested locus and in effect acts to drown the pest. Thus, the organophosphate or other active ingredient is optional.

3. For soil penetration, the composition of the invention acts to retain water in the surface of soil to which it is applied. Thus, if an active ingredient such as atrazine is applied to a crop, residual atrazine which falls on the soil is held there and is effectively prevented from being leached to underground water systems until it has been biodegraded.

The invention will be illustrated further by the following specific examples.

EXAMPLE 1

A mixed calcium and magnesium alginate gel was made in the following manner. Seaweed of the Laminaria type was brought to the boil with sodium carbonate solution and then milled in a high shear mixer to produce a slurry containing the milled seaweed. The slurry contained approximately one percent by weight sodium alginate. The slurry was filtered to remove 150 micron insoluble weed body. To the filtered slurry was added finely particulate bentonite which had been pre-swelled with water to give a composition containing about 8 percent by weight bentonite. The bentonite had the following composition:

SiO	60,99%
Al O	20,30
Fe O	6,16
TiO	0,35
CaO, MgO, Na O	7,43
K O	3,73
MOISTURE	9,9

Ion exchange occurred over a period of about 30 minutes producing a mixed calcium and magnesium alginate gel of good gel strength. The thus produced gel was filtered again to remove + 70 micron insolubles. The final composition was as follows:

Component	Amount (per 250ℓ)
Alginate (predominantly calcium)	1,3 kg
Bentonite	6,0 kg
Water	241 ℓ
Other seaweed solubles & insolubles	2,0 kg
- 70 micron insolubles	0,2 kg

EXAMPLE 2

A mixed calcium and magnesium alginate gel in a water base was made in the manner set out in Example 1 except the seaweed used was of the Ecklonia Max. type.

EXAMPLE 3

The composition of Example 1 had added to it sodium dioctyl sulfosuccinate (a wetting agent), silicon 1520 (a de-foamer from Dow Corning) and acetic acid. The final composition had the following constituents:

Ingredient	Percent by Weight
Sodium Dioctyl Sulfosuccinate	10
Alginate Cel	20
Silicon 1520	0,4
Acetic Acid	to pH 7,2
Water	balance

This composition was an excellent wetter/sticker adjuvant for various spray applications and can be used in

the manner set out in Table 1 above.

EXAMPLE 4

250ml of a composition as produced in Example 1 was added to 100ℓ water. Also added to the water was tartar emetic and sucrose each in an amount of 400g. The diluted composition was thoroughly mixed. The composition was then delivered to a spray nozzle for application to a citrus crop. It was found that an excellent application of the composition to the citrus crop was achieved with the composition being firmly adhered to the leaves and fruit of the trees. Further, good control of the thrips was achieved. It was noted that the composition was not removed by rain from the trees.

EXAMPLE 5

A solution was made of sodium alginate, sucrose and tartar emetic by dissolving the various components in water. Each of the components was provided in an amount of 400g per 100ℓ. 200g of finely divided dibasic calcium phosphate was dispersed in 1ℓ of water. The dispersion was added to the solution and the mixture delivered to a spray nozzle for application to a citrus crop. On delivery of the mixture to the spray nozzle the gel began to form. However, by the time the mixture was sprayed on to the crop, gelling had not occurred to an extent whereby the nozzle became blocked. The formation of a calcium alginate gel was completed soon after application to the crop. The coating for the crop which was obtained consisted of a calcium alginate gel which was non-phytotoxic and substantially water-insoluble and included the tartar emetic and the sucrose. The gel did not in any way affect the efficacy of the tartar emetic in controlling the thrips.

Claims

1. A composition for application to a soil or plant locus including gel comprising a major amount of water and a minor amount of an alginate gel matrix uniformly dispersed through the water.

2. A composition according to claim 1 wherein the water is present in an amount of at least 90 percent by weight of the gel and the alginate gel matrix is present in an amount of up to 5 percent by weight of the gel.

3. A composition according to any one of the preceding claims wherein the alginate gel matrix is an alkaline earth metal alginate gel matrix.

4. A composition according to claim 3 wherein the alkaline earth metal is calcium, magnesium or a mixture thereof.

5. A composition according to any one of the preceding claims which includes bentonite, the weight ratio of the alginate gel matrix to bentonite being in the range 1:1 to 1:10.

6. A composition according to any one of the preceding claims in which the gel contains at least 0,05 percent by weight - 70 micron insolubles.

7. A composition according to any one of the preceding claims in which the gel contains at least 0,5 percent by weight - 70 micron insolubles.

7. A composition according to any one of the preceding claims in which the gel contains at least 0.5 percent by weight - 70 micron insolubles.

8. A composition according to any one of the preceding claims which includes a wetting agent.

9. A composition according to claim 8 wherein the wetting agent is an anionic surfactant.

10. A composition according to any one of the preceding claims which includes a herbicide, pesticide, fertiliser, fungicide or the like.

11. The use of an alginate gel in the manufacture of a composition according to any one of the preceding claims.

12. The use according to claim 11 wherein the alginate gel is an alkaline earth metal alginate gel.

13. The use according to claim 12 wherein the alkaline earth metal is calcium, magnesium or a mixture thereof.

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EUROPEAN SEARCH REPORT

Application Number

EP 87 31 0613

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
X	FR-A- 742 436 (SOCIETE OCEANA) * Page 1, lines 17-36 *	1-13	A 01 N 25/04 A 01 N 25/14
X	FR-A-1 521 308 (SEPPIC) * Examples *	1-13	
X	GB-A-1 271 575 (GALDONOST) * Claims *	1-13	
X	GB-A-1 308 614 (FISONS) * Claims *	1-13	
X	CHEMICAL PATENTS INDEX, Basic Abstracts Journal, section C, week 8636, 29th october 1986, abstract no. 86-236762/36, Derwent Publications Ltd, London, GB; & JP-A-61 167 603 (EC KAGAKU KOGYO K.K.) 29-07-1986 * Abstract *	1-13	
A	CHEMICAL ABSTRACTS, vol. 91, no. 24, 10th December 1979, page 63, abstract no. 194510p, Columbus, Ohio, US; A. BENDAK et al.: "Evaluation of bentonite as a print thickener for cotton/polyester fabric", & CELLUL. CHEM. TECHNOL. 1979, 13(2), 241-54 * Lines 6,7 *	5	TECHNICAL FIELDS SEARCHED (Int. Cl.4) A 01 N
X	US-A-3 537 873 (E.R. DEGGINGER) * Column 2 *	1-13	

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	16-03-1988	DECORTE D.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

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